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Application number: **09/535,547**
Applicant: **Thieberger Gil**
Title: **Flat Ophthalmic Lens Synthesized from its specifications**
Date of mailing: **9 September 2002**

Response to 6/20/2002 Office Action

Assistant Commissioner for Patents
Box Patent Application
Washington, D.C. 20231

Sir:

- The applicant requests to replay to the office action, date of mailing: June 20, 2002.

This is a certification copy of my answer that
was send at 9 September 2002 to FAX number
703-872-9318

1. Discussion of the main idea of the present invention

Mainly to reduce manufacturing cost and manufacturing complications, the lens of the present invention is designed to be manufactured as a thin flat sheet, and after or while being manufactured, the thin sheet **is folded to the predefined arched shape**.

In order to make a thin arched prescription lens, the surface of the lens of the present invention is made of plurality of smooth prisms that are calculated numerically as explained from page 8, line 22 to page 15 line 18. It is important to emphasize that the prisms are not calculated according to the known Fresnel formula. Fresnel lens is not applicable for the object of the present invention because it is designed to be used only when its surface is flat, spherical, or toric. The image quality of a Fresnel lens is severely damaged whenever the lens is folded/curved to an arched shape!

Only whenever the lens of the present invention is made as a protected lens (please refer to page 15 line 19 to page 16 line 14 of the specification of the present invention), both surfaces of the lens of the present invention are smooth.

2. The References and the differences of the present invention there-over

The applicant will discuss the references cited by the examiner and the general novelty of the present invention and its non-obviousness over those references.

An important remark concerning all the prior art references cited by the examiner:

In order to make a lens which is manufactured as a thin flat sheet, and after or while being manufactured, the thin sheet is folded to a predefined arched shape, the designing process **must** take in account the fact that the lens is manufactured flat, and after that, it is folded/curved to a predefined arched shape. All the cited references assume that the lens will not be folded after manufacturing. As a result, non of the cited previous art patents are applicable for designing lenses which are manufactured as a thin flat sheet and after, or while manufacturing, the thin sheet is folded to a predefined arched shape.

US patent number 4,070,105 to Marzouk

Marzouk disclosed a multi-element ophthalmic lens construction containing two Fresnel lens elements bonded together to form an ophthalmic lens. Marzouk's disclosure is unrelated to the present invention and the disclosed solution is not applicable to a production of a lens according to the present invention. Specifically:

1. According to Marzouk, the lens elements are Fresnel lenses. Fresnel lenses must have a flat, spherical or toric surface due to the fact that the discontinuity pattern is made of circle like shapes which are concentric, as can be seen for example at Fig 1 and column 1 line 52 and column 2 line 7. Fresnel lens can not have an arched shape without severely damaging the image quality. In contrary, according to the preferred embodiment of the present invention, the lens is manufactured as a flat sheet, in order to reduce manufacturing costs, and after, is curved.
2. Marzouk does not disclose or even discuss the possibility of manufacturing the lens as a thin flat sheet, and after or while manufacturing, the thin sheet is folded to a predefined arched shape. As a result, the lens according to the applicant has a different shape and is less expensive and much more easy and simple to manufacture.

Specifically, independent claim 1 includes step b: "transforming said surface heights of said arched surface to surface heights of a flat surface". This step is one of the key features of the present invention and is undoubtedly new, novel and non-obvious over Marzouk. Applicant respectfully submits that independent claim 1 and its dependent claims 2-19 are novel and non-obvious over Marzouk.

Specifically, independent claim 20 of the present invention states: "An optical device ... characterized by the fact that it can be curved to become a prescription optical device, and after curving said optical device ... light rays are refracted according to a required predetermined prescription". In contrary, the Fresnel lens of Marzouk is not designed to be curved and can not be characterized by the fact that it can be curved to become a prescription optical device because whenever a Fresnel lens is curved, its image quality is severely damaged. Applicant respectfully submits that independent claim 20 and its dependent claims 21-25 are novel and non-obvious over Marzouk.

Independent claim 26 and its dependent claims 27-34 and independent claims 35-36 are novel and non-obvious over Marzouk due to similar reasons.

3. Marzouk Fig 2, cited by the examiner is (column 2 line 31) a side exploded view of the Fresnel lens according to Mazouk. The three-dimensional structure of the lens in FIG 2 is spherical and not a curved flat surface! Applicant respectfully submits that the side exploded view figure cited by the examiner was not interpreted properly and is physically different from the lens of the present invention.

US patent number 4,146,306 to Wallach

Wallach disclosed a multi-element ophthalmic lens construction containing at least two **Fresnel** lens elements bonded or fused together. Wallach's disclosure is unrelated to the present invention and the disclosed solution is not applicable to a production of a lens according to the present invention. Specifically:

1. According to Wallach, the lens elements are Fresnel lenses. Fresnel lenses must have a flat, spherical or toric surface due to the fact that the discontinuity pattern is made of circle like shapes which are concentric, as can be seen for example at Figs 1, 3, 4, 5 and 8. Fresnel lens can not have an arched shape without severely damaging the image quality. In contrary, according to the preferred embodiment of the present invention, the lens is manufactured as a flat sheet, in order to reduce manufacturing costs, and after, is curved.
2. Wallach does not disclose or even discuss the possibility of manufacturing the lens as a thin flat sheet, and after or while manufacturing, the thin sheet is folded to a predefined arched shape. As a result, the lens according to the applicant has a different shape and is less expensive and much more easy and simple to manufacture.

Specifically, independent claim 1 includes step b: "transforming said surface heights of said arched surface to surface heights of a flat surface". This step is one of the key features of the present invention and is undoubtedly new, novel and non-obvious over Wallach. Applicant respectfully submits that independent claim 1 and its dependent claims 2-19 are novel and non-obvious over Wallach.

Specifically, independent claim 20 of the present invention states: "An optical device ... characterized by the fact that it can be curved to become a prescription optical device, and after curving said optical device ... light rays are refracted according to a required predetermined prescription". In contrary, the Fresnel lens

of Wallach is not designed to be curved and can not be characterized by the fact that it can be curved to become a prescription optical device because whenever a Fresnel lens is curved, its image quality is severely damaged. Applicant respectfully submits that independent claim 20 and its dependent claims 21-25 are novel and non-obvious over Wallach.

Independent claim 26 and its dependent claims 27-34 and independent claims 35-36 are novel and non-obvious over Wallach due to similar reasons.

3. Wallach Fig 8a, cited by the examiner is (column 2 line 5) a cross section view of the Fresnel lens according to Mazouk. The three-dimensional structure of the lens in FIG 2 is spherical and not a curved flat surface! Applicant respectfully submits that the cross section view figure cited by the examiner was not interpreted properly and is physically different from the lens of the present invention.

Mirrors according to Marzouk & Wallach are physically different

As was written before, none of the cited previous art patents are applicable for designing lenses which are manufactured as a thin flat sheet, and after, or while manufacturing, the thin sheet is folded to a predefined arched shape. In addition, the physical shape of the spherical Fresnel lenses according to Marzouk or Wallach is different from the curved shape of the lens according to the present invention.

As a result, a mirror according to the structure of Marzouk or Wallach would have a different physical shape and would be produced differently.

By this Response, the Applicant respectfully submits that all claims are in condition for allowance, and such action is respectfully solicited.

Very respectfully,

Gil Thieberger

Thieberger Gil